REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claim 6 is currently being amended. Claims 39-47 are added as new claims. Claims 1, 3-14, and 29-47 are pending in the application. Re-examination and reconsideration of the application, as amended herein, are requested.

Applicant notes with appreciation the Examiner's withdraw of the anticipation rejection over Shulman '043 and the obviousness rejection over Shulman '043 in combination with other references.

Claims 1, 6, 10-14, 29, and 31-34 are rejected under 35 U.S.C. § 102(b) as been anticipated by U.S. Patent No. 5,693,577 to Krenik et al. Claims 3, 4, 7, 30, 35-36, and 38 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Krenik et al in view of U.S. Patent No. 6,414,835 to Wolf et al. Claims 5 and 37 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Krenik et al in view of U.S. Patent No. 6,516,808 to Schulman. Claims 8-9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Krenik et al in view of U.S. Patent No. 6,498,043 to Schulman et al. These rejections are respectfully traversed, in view of the amendment herein.

In particular, claim 1 recites a sensing apparatus that comprises a substrate having first and second sides and a via comprising a linear hollow path formed from the first side of the substrate to the second side of the substrate and filled with an electrically conductive material for making electrical contact from the first side of the substrate to the second side of the substrate, wherein the via is hermetically sealed from the first side of the substrate to the second side of the substrate. Krenik neither discloses nor suggests a linear hollow path or a hollow path filled with an electrically conductive material.

As described in the present specification, embodiments of the present invention involve a substrate in which a linear hollow path extends from the first side (sensor side) to the second side (electronics side). The hollow path may be formed by laser drilling, punching or other suitable

manufacturing processes capable of producing a linear hollow path. (See pg. 7, ll. 3-7 and pg. 9, ll. 27-29 of the present application.) In contrast, no hollow path is formed in the process described in Krenik. (See Figs. 8-14 of Krenik.) Krenik describes a method in which a window 29 is formed through protective oxide layers 23 and 24 on the substrate 22, and impurities are diffused into the substrate through the windows 29. (See col. 2, ll. 60-67 of Krenik.) One embodiment of Krenik describes the thinning of the substrate in the area defined by the windows 29. (See col. 3, ll. 5-11.) However, in Krenik, there is not a linear hollow path that extends from one side of the substrate to the other. In fact, forming a hollow path would be inconsistent with the diffusion steps described in Krenik, because diffusion necessarily requires a solid substrate material into which an impurity is disposed.

Claim 1 further recites that the linear hollow path is filled with an electrically conductive material. In contrast, Krenik does not have a hollow path filled with an electrically conductive material. Instead, Krenik creates a conductive via by diffusing impurities into the semiconductor substrate. (See col. 2, ll. 65-67, col. 3, ll. 1-4 of Krenik.) It is well known to those skilled in the art that the conductance of a semiconductor material can be increased through the introduction of impurities by diffusion or implantation. Hence, the process described in Krenik merely alters the conductivity of the existing semiconductor substrate material. No linear hollow path exists in Krenik's substrate material. Instead, in Krenik, the conductive vias are still substantially the same material as the substrate, only doped with additional impurities. Impurities, such as the example of boron given by Krenik, are typically non-conducting or semi-conducting as well. Therefore, in addition to the lack of a linear hollow path, Krenik does not teach of any hollow path filled with an electrically conductive material.

In contrast, a sensing apparatus having a substrate with "a linear hollow path ..." as recited in claim 1 provides significant advantages over a device formed by diffusion as described in Krenik, because Krenik's diffusion process can only be employed with a semiconductor substrate material capable of receiving diffused impurities. However, according to embodiments of the present invention, a linear hollow path can be formed in many different types of substrate materials, for example, by laser drilling, punching or other suitable manufacturing processes capable of producing a linear hollow path. (See pg. 7, ll. 3-7 and pg. 9, ll. 27-29 of the present

application.) Hence, the substrate material of employed in a sensing apparatus of claim 1 may be any suitable substrate material, as long as a linear hollow path can be formed through that material. In contrast, Krenik's diffusion process requires the substrate material to be a semiconductor material. It is well known to those skilled in the art that the method of altering the conductivity of a material through the introduction of impurities is a property unique to semiconductor materials. Hence, Krenik's process would be inapplicable, if the substrate is composed of a non-semiconductor material.

Therefore, because Krenik neither describes nor suggests a via comprising a linear hollow path formed from the first side of the substrate to the second side of the substrate and filled with an electrically conductive material, it is respectfully submitted that claim 1 is patentably distinguishable from Krenik under 35 U.S.C. 102. Because claims 3-14 are dependent claims based on claim 1, those claims are believed to be allowable as well for at least the reasons discussed above with respect to claim 1.

Claims 29 and 31 also recite the feature of "a linear hollow path formed from the first side of the substrate to the second side of the substrate and filled with an electrically conductive material". Hence claims 29 and 31 are patentably distinguishable from Krenik for the same reasons as stated above for claim 1. Because claims 30 and 32-38 depend on claims 29 or 31, they are believed to be allowable as well for at least the reasons discussed above with respect to claim 1.

Amended claim 6 recites that "the substrate is ceramic insulator". In paragraph 5 of the Office Action, the Examiner rejected claim 6, stating that the substrate taught by Krenik is made of "silicon ceramic material". Typically, "ceramic" is used to describe non-conductive materials (insulators). Krenik teaches the use of a semiconductor silicon substrate (see col. 2, ll. 3-4 of Krenik.), which is typically crystalline silicon. Semiconductors have relatively low conductance compared to conductors, but higher conductance than insulators. Hence, to avoid confusion and expedite the prosecution of the patent application, claim 6 is amended to recite "wherein the substrate is ceramic insulator." Therefore, claim 6, as amended, is distinguishable from Krenik and is believed to be allowable for this reason in addition to the reasons stated above.

Claim 3, 30, and 35 recite that "the electrically conductive material is a fritless ink." Claims 6 and 36 recite that "the fritless ink is a gold paste", while claims 7 and 37 recite that "the fritless ink is a platinum paste." Claims 7 and 38 recite that "the substrate is substantially 92%-98% alumina." In paragraph 5 and 6 of the Office Action, the Examiner rejected claims 3-5, 7, 30, and 35-38, stating that it would have been obvious to one of ordinary skill in the art to combine the teachings of Wolf or Schulman '808 with Krenik, to create gold or platinum conductive pathways in ceramic or alumina substrate using the method described in Krenik.

As discussed above, it is well known to those skilled in the art that the impurities diffusion method described in Krenik can only be applied to semiconductors. In addition, it is also well known that semiconductor dopants (impurities) must be a group III element (e.g. boron) or a group V element (e.g. phosphorus). Alumina and other ceramic insulators are not semiconductor materials, and gold paste, platinum paste, or other fritless ink cannot be used as semiconductor dopants. Therefore, one cannot create gold, platinum, or other fritless ink conductive vias using the diffusion method in Krenik. Hence, Applicant respectfully traverses the attempt to combine Krenik's diffusion process with materials not capable of diffusion described by Wolf or Schulman to form the rejection of claims 3-5, 7, 30, and 35-38. Accordingly, those claims are believed to be allowable for this reason in addition to the reasons stated above.

New dependent claims 39-41 recite that the "linear hollow path defines a boundary between the electrically conductive material and the substrate." These new claims recite features not disclosed or suggested by Krenik. As noted above, Krenik describes the use of diffusion to create conductive vias. It is well known that in a diffusion process, the concentration of impurities tapers off with distance away from the diffusion source. Hence the conductive vias recited in Krenik do not have distinct boundaries with the substrate. Therefore, claims 39-41 are believed to be allowable.

New dependent claims 42-44 recite that the "substrate is insulating." New claims 45-47 recite that the "substrate is non-conducting and non-seminconducting." These new claims recite features not disclosed or suggested by Krenik. As discussed above, Krenik requires the substrate

material to be a semiconductor material. Therefore, claims 42-47 are also believed to be allowable.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-0872. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-0872. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-0872.

Respectfully submitted,

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